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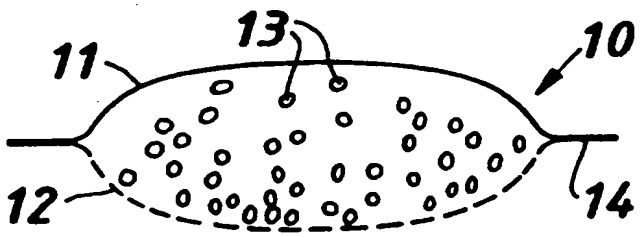

(57) Abstract

A wound dressing (10) for irregularly shaped exuding wounds comprises a bag or pouch of which a part (11) of the surface is impermeable to water and a different part (12) is permeable to water, the bag being loosely filled with pieces of absorbent material (13) and optionally having an adhesive flange (18, 19).

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CONFORMABLE ABSORBENT DRESSING

The present invention relates to wound dressings, in particular dressings for irregularly shaped wounds.

Certain wounds present particular difficulties in choosing and applying a dressing because of their awkward shape. One example of such a wound is a fungating carcinoma which is usually irregularly shaped and often protrudes from or extends into the skin. These wounds are usually unsightly and often exude heavily, the exudate typically having a characteristically unpleasant odour. In order to prevent leakage of exudate a dressing should be well adhered to surrounding skin but it can be difficult to achieve satisfactory adhesion around such a wound using conventional flat dressings. It is common for healthcare workers to spend a great deal of time dressing these wounds because they are distressing for the patient but the high rate of exudate evolved may necessitate frequent dressing changes. Dressings which can absorb a large volume of exudate tend to be relatively difficult to shape to conform to extremely irregular protruding wounds without allowing exudate to leak.

A wound dressing which comprises individual pieces of absorbent material contained within a porous bag is described in EP-A-0171268. That dressing is, however, designed for use in deep cavity wounds and may be unsuitable for the irregularly shaped wounds described above.

There is therefore a need for a dressing which can conform to irregular or lumpy wounds and which can absorb large quantities of exudate, whilst being relatively easy to apply. It is an object of the present invention to provide a dressing which solves some at least of the problems described above.

According to the invention, a wound dressing comprises a plurality of discrete pieces of absorbent material loosely enclosed within a conformable bag or pouch such that said pieces may move freely within said bag, said bag being permeable to water over a

part of its surface and impermeable to water over a different part of its surface.

The absorbent material may comprise natural or synthetic absorbents such as pulped paper based materials, woven or non-woven fibrous absorbents, gels, hydrocolloids or super-absorbents such as alginates, cereal husk derivatives, cellulose derivatives, naturally occurring or derived gums etc. One preferred absorbent is a foam material, especially a hydrophilic foam material.

A preferred absorbent is a resilient, open cell foam. Suitable open cell hydrophilic foams will have a cell size of 30μm to 700μm and preferably a cell size of 50μm to 500μm. Such hydrophilic open cell foams will have 20% to 70% and preferably 30% to 60% of the total membrane area of the cells as membrane openings. Such open cell foams permit transport of fluid secreted from the wound and of any cellular debris into and within the foam as well as between individual pieces of the foam.

Suitable foams include polyurethane, carboxylated butadiene-styrene rubber, polyacrylate, polyvinylic or cellulosic foams. Polyvinylic foams include polyvinyl acetal foams formed by the reaction of polyvinyl alcohol and an aldehyde, usually formaldehyde or acetaldehyde. Such foams are generally hard until wetted by water. It is envisaged that such foams may be used dry or may be wetted and squeezed 'dry' whereupon they retain sufficient moisture to remain soft and flexible. Suitable foams may be prepared from hydrophilic materials per se or may be treated to render them hydrophilic, for example with surfactants. It is preferred however to use foams which are made of a polymer which is itself hydrophilic. Such foams have been found to be less likely to cause the wound exudate to coagulate rapidly. It is also within the scope of the invention that two or more absorbents may be used or a combination of a foam with an absorption enhancing material such as, for example, a cellulose material in a form which is capable of being retained within the bag.

Favoured hydrophilic polymer foams are hydrophilic polyurethane foams. One favoured foam is made of cross-linked hydrophilic polyurethane. Particularly favoured foams can be made by reacting a hydrophilic isocyanate-terminated polyether prepolymer with water. Preferred hydrophilic polyurethane foams of this type include those known as Hypol (trade mark) foams. Hypol foams can be made from Hypol hydrophilic prepolymers marketed by W.R. Grace and Co.

A second favoured foam may be formed by foaming, for example by blowing or reticulating, a hydrophilic polyurethane described in United Kingdom Application No. 2093190. Suitable polyurethanes include the linear polyether polyurethanes described therein and which are incorporated herein by cross-reference. For use in the dressings of the present invention the hydrophilic polyurethanes are foamed using a conventional blowing agent or are reticulated by conventional means.

One way of forming the foam will be to cast a foamable composition onto a support to which it is not adherent and after curing the foam is recovered in the form of a sheet having a thickness of from 1 to 15mm, more suitably 2 to 10mm, preferably 3 to 5mm. The sheet of foam may then be cut into pieces which have a size of 0.5 x 0.5mm to 15 x 15mm, and more suitably about 1 x 1mm to 10 x 10mm, preferably 3 x 3 to 7 x 7mm and most preferably 3 x 3 to 5 x 5mm.

The pieces used need not necessarily be uniformly shaped. Irregular shaped pieces would result from chopping the foam in, for example, a kitchen blender or a fixed blade comminutor. Pieces which have uniform shape such as parallelepiped or cuboid may be formed by cutting the cast foam sheet using scissors, a sharp knife or other sharp bladed mechanical device. It is preferred that the pieces are approximately cuboid in shape.

Alternatively the conformable hydrophilic polyurethane foam can be made by mixing together an isocyanate terminated polyether having functionality of more than two with a surfactant and water

and casting the mixture onto a surface which is non-adherent to the foam. Preferred isocyanate terminated polyethers include Hypols FHP 2000, 20001, 3000, 3001, 2002 and 2000HD marketed by W.R. Grace & Co. Hypols are described in a booklet published by W.R. Grace & Co. "Hypol: foamable hydrophilic polymers - laboratory procedures and foam formulation". Their preparation and use are disclosed in British Patent Specifications No. 1,429,711 and 1,507,232.

The material used to form the porous bag employed in the present invention is suitably an elastic, flexible material which has a soft feel when in contact with the skin. It is liquid permeable over a part of its surface. By liquid permeable it is meant that the material has been adapted to allow the passage of liquids such as blood, water, and wound exudate. Liquid permeability may be a result of the structure of the material, e.g. a relatively open, fibrous structure, or the material may be rendered permeable by providing it with apertures. The material may possess apertures either by virtue of a manufacturing process, that is the material is an integral net or woven fabric for example or by forming the apertures in a film or layer of the material by means of conventional methods including needling, electric discharge, vacuum perforation, hot jet perforation and moulding under heat and pressure on a suitable former or by fibrillation of an embossed film.

Preferably the material has a reduced tendency to adhere to a moist wound surface. The material will be chosen to enclose the pieces of absorbent and to isolate the wound surface from contact with the absorbent. The bag material is preferably not adhered to the absorbent. The size of the apertures in the bag material will be chosen not only to prevent pieces of absorbent escaping from the bag but also to prevent parts of the pieces of absorbent from protruding from the dressing and abrading the wound surface or adhering to it.

The bag is impermeable to liquid over a part of its surface. This part of the bag may be formed from an unperforated polymeric film or from an inherently permeable material such as a fabric which

has been treated, e.g. by coating, to render it impermeable. The impermeable part of the bag may be formed from a similar basic material to that used for the permeable part of the bag (i.e. differing only in permeability to water) or it may be formed from a different type of material. In one form of the invention, the bag will be formed from two pieces of similar conformable plastics film, one piece being perforated to allow water to pass through the film and into the interior of the bag. Alternatively the two parts of the bag may be formed from different materials. As a further alternative a single piece of material may be used which is water permeable in one region and water-impermeable in a different region.

Preferably the material used for forming the liquid-permeable part of the bag will be a perforated polymeric film such as an integral net, for example formed either by the fibrillation of embossed films of polymeric material by biaxially stretching the film or by casting the material from a solution onto an embossed former. Suitably the material is made from hydrophobic polymers including high or low density polyethylene, polypropylene, polyurethane, polystyrene or copolymers or mixtures thereof or styrene-butadiene or styrene-isoprene-block copolymers. Alternatively the liquid-permeable part of the bag may be formed from a knitted, woven or non-woven material which is permeable to wound exudate.

The apertures in the material may be any convenient shape but are favourably of a circular shape. suitably the apertures will be 0.1mm to 4mm in diameter, more suitably 0.5mm to 3mm and preferably 1 to 2.5mm in diameter. If the apertures are irregular then they will have an area equivalent to that of the circular apertures described above.

One favoured form of material for forming the porous part of the bag for use in the present invention is an integral net. Aptly such nets are formed by the fibrillation of a thermoplastic embossed polyolefin film comprising low and high density polyethylene, polypropylene or copolymers or blends thereof or blends of polyolefin with polystyrene. The manufacture of such a net is described in for example British Patents Nos. 914489, 1055963,

1075487, 1106254, 1110051, 1261515, 1496786, 1531715 and 1548865, which patents are incorporated herein by cross-reference.

One preferred form of integral net may be formed by the process described in British Patent No. 1548865. This net is formed from hydrophobic polymers which include high density polyethylene and a blend of a high density polyethylene and high impact polystyrene.

Alternative materials for forming the porous material for use in the present invention are integral cast nets such as those formed by the process described in our copending United Kingdom Application No. 2093702 at page 7 lines 20 to 38 which are incorporated herein by cross-reference.

A preferred material however for forming the porous material used in the present invention is in the form of a contoured net. This net comprises a film which has a plurality of depressions impressed out of the plane of the film. In the permeable part of the bag, each of the depressions has an aperture at the bottom. The net therefore is not flat but has a finite thickness. The thickness is defined as the perpendicular distance between the bottom of the depressions and the plane of the film. It has been found that these nets are flexible, elastic and have a particularly soft feel. The dressings of the invention are formed with the apertured depressions of the permeable part of the bag facing into the interior of the dressing so that the pieces of absorbent are maintained at a distance from the wound surface but without impeding the absorption capacity of the dressing nor adversely affecting the rate at which wound exudate is taken into the dressing.

Contoured nets of the above type and methods for their manufacture are described in EP-A-0171268.

Suitably the contoured net will have a thickness as hereinbefore defined of from 0.5 to 2mm, more suitably 0.75 to 2mm and preferably 1.0 to 1.5mm. Suitably the apertures in the net will

have an area equivalent to a circle of diameter 0.5mm to 1.5mm, and preferably 0.75 to 1.0mm.

Polymeric material which is suitable for preparing contoured nets as described above include thermoplastic elastomeric polymers or polymer blends. A favoured polymeric material is a blend of an ethylene-vinyl acetate copolymer and an incompatible polymer such as a polyolefin and particularly polystyrene. A particularly preferred polymeric material is a blend of from 40 to 90 parts by weight of ethylene-vinyl acetate copolymer and 60 to 10 parts by weight of polystyrene and more preferably 60 to 90 parts ethylene-vinyl acetate copolymer and 40 to 10 parts polystyrene. The polymeric material preferably includes fillers or whitening materials such as titanium dioxide, because it maybe desirable to cover wounds from sight.

The film from which the contoured net is formed may suitably have a thickness of from 50μm to 120μm and preferably 95 to 100μm.

In a further aspect of the present invention a bulky non-woven fabric, usually called a fleece, may be present between the walls of the bag and the pieces of absorbent. The presence of this fleece makes the dressing softer, more resilient and more aesthetically pleasing and may also act to disperse the wound exudate as it passes through the apertured film bringing the exudate in contact with more absorbent more quickly. The fleece may also provide an additional absorbency to the dressing and help contain small pieces of absorbent material within the bag. Suitable materials for forming the fleece include polyethylene, polypropylene, polyester, polyamide and the like. It may be desirable to employ a mixture of a minor proportion of a hydrophilic polymer in forming the fleece. A suitable mixture may comprise particularly rayon and polypropylene and an apt mixture is 10% rayon/90% polyethylene. Suitably the fleece will have an uncompressed thickness of from 0.5mm to 2mm.

Another suitable material for forming the porous material of the bags used in the present invention is a contoured net as described

hereinbefore which has been coated on the embossed surface with polymer fibres formed by spraying a solution of the polymer whereby the solvent evaporates in flight and the fibres so formed are collected on the contoured net to form a non-woven fabric which is adhered to the contoured net. Observation of the coating using an optical microscope shows that some of the fibres bridge across apertures, where present, but without deleteriously affecting the absorption of the dressing or without affecting the elasticity of the contoured net. Suitable polymers for forming a coating in this way are those which are soluble in volatile solvents and include polyurethanes and styrene-butadiene block copolymers.

Another preferred film which may be used to form the bag or pouch is a polyurethane film, preferably a hydrophilic polyurethane which has a moisture vapour permeability of greater than 200g/m^2/24h. Such a film is impermeable to liquids and so it is particularly suitable for the impermeable part of the bag because moisture from absorbed exudate inside the bag may be transmitted through such a film and so increase the effectiveness of the dressing in removing exudate from a wound. A similar material may be perforated and used to form the liquid-permeable part of the bag.

The bag or pouch may be formed from a piece of perforated film and a piece of non-perforated film, both being of the same size and shape and superimposed one upon the other. They are then adhered to each other around the edges of the films, by welding, heat-sealing or by means of an adhesive. The absorbent pieces should be placed inside the bag before it is completely sealed around its edges. In some forms of the invention, the bag or pouch may be formed from two pieces of film or other material which are of unequal size, the liquid-impervious piece usually being larger so as to form an imperforate perimeter to the bag.

The proportion of the surface of the bag which is formed of material which is permeable to water is preferably up to 50%. In some forms, more than 50% of the bag surface is formed from imperforate, liquid-impermeable material. Alternatively the bag

could be permeable over a greater part of its surface than the impermeable part.

Preferably at least a discrete region of the bag corresponding to at least 20% of the surface area of the bag is formed from a continuous material which is impervious to liquid water. That region may be at least 40% or at least 50% in preferred embodiments of the invention.

The total dry volume of absorbent pieces contained within the bag should be considerably less than the volume of the bag in order to provide space for the pieces to move around the bag when it is shaken. This enables the absorbent pieces to be moved around the bag so that the dressing may be shaped to conform to the contours of the wound. For example, if a protruding tumour is to be dressed, the absorbent pieces may be moved to the edges of the bag so as to be able to surround the tumour and conform to its shape. The dressing is placed on the wound with the liquid-permeable part of the bag facing the wound and the impermeable part facing away from the wound.

There should be sufficient absorbent material within the bag to provide adequate absorbent capacity for wound exudate. However, if the bag is relatively full then the dressing will be more difficult to conform around the wound. For any given selection of bag size/shape and absorbent, the degree of fill is therefore selected to optimise the conformability of the dressing and the dressing absorbency. For a round bag with foam absorbent, a fill of between 30 and 70% in terms of bulk volume of absorbent compared to the volume capacity of the bag has been found to be suitable.

The shape of the bag or pouch which contains the absorbent pieces is preferably regular and may be circular, square, hexagonal etc. The bag may also be toroidal or annular. It may be any practical size commensurate with the purpose which it is intended to fulfil i.e. it should be sized so as to be able to cover a majority of the wounds for which it is designed and commercial examples of the dressing may be made available in a range of sizes.

The dressing may comprise more than one bag containing absorbent. For example several such bags may be adhered to an adhesive liquid-impermeable backing film. The bags may be placed in a pattern such as a circle or evenly spaced. This type of arrangement may provide a means to contain a certain amount of absorbent in contact with a particular part of the wound.

In a preferred form, the bag has a flange extending outwardly from the perimeter of the bag. The flange may be formed from an extension of the unperforated part of the bag or, where the bag is formed from two pieces of material placed together, the edges of the material which are welded or adhered together may form a flange. Most preferably the flange is adjacent to and continuous with the unperforated part of the bag. In one preferred embodiment, the bag is formed from an upper, continuous film and a lower, perforated film, each piece of film being circular, and the upper piece being of a larger diameter than the lower piece. The two pieces are then joined e.g. by heat welding around the perimeter of the perforated film forming a bag with a perimeter flange formed from the outer part of the upper, continuous film. Preferably the flange has an adhesive side and a non-adhesive side, the adhesive side being placed so as to enable the flange to be stuck to skin surrounding a wound such that the permeable part of the bag faces the wound and the impermeable part of the bag faces outward, away from the wound. When the flange does not have an adhesive side, the dressing may be secured over and around the wound by means of adhesive tape placed over the flange. The flange assists in ensuring that a good seal may be formed between the dressing and the skin so that wound exudate and odour cannot escape from under the dressing.

In a preferred form an adhesive flange structure is sealed to the flange of the bag all around the perimeter so as to extend outwardly from the perimeter of the flange. The adhesive structure preferably comprises a conformable film which is provided with a layer of medically acceptable pressure-sensitive adhesive, which is protected by a suitable release paper. The film is preferably permeable to moisture vapour to enable sweat to evaporate from the

skin to which the film is adhered, thereby avoiding maceration of the skin. The film may be a thin film of the type used in thin-film dressings, such as hydrophilic polyurethane for example. Such thin films may beneficially have a relatively stiff support layer releaseably secured to the non-adhesive side of the film to assist the user to apply the adhesive film to the skin around the wound without creasing the film.

The wound dressings of the present invention may further contain physiologically active components which are present in therapeutically effective amounts. The wound dressing may contain, for example, local anaesthetics, hormonal compounds, enzymes, antibacterial agents, antifungal agents, debriding agents and less favourably lubricating and barrier chemicals such as silicone compounds. The additional components should be compatible with the absorbent material used in the dressing and may be incorporated into the absorbent during its manufacture. A preferred additional component is an antibacterial agent and is most preferably a water soluble antibacterial agent. Suitable antibacterial agents include chlorhexidine or a salt thereof, a silver salt such as sulver sulphadiazine or an acceptable iodine source such as povidone-iodine.

The physiologically active component may be present by 0.2 to 20%, more usually from 0.3 to 10% and preferably 0.5 to 5% by weight of the dressing, for example 1%, 2% or 3%.

It may be advantageous to incorporate an odour absorbing material in the dressing. For example, the absorbent pieces may be formulated to include activated charcoal as an odour-absorbing agent. Alternatively a layer of an odour-absorbing material, such as a fabric which incorporates activated charcoal, may be placed adjacent to the material forming the bag, preferably inside the bag, or may form part of the flange or a seal between the flange and the bag. A perfume may be incorporated into the absorbent or the material of the bag either as an alternative to or in addition to an odour-absorbing material.

In a further aspect of the invention we provide a method of making a wound dressing comprising the steps of placing together a layer of a water-impermeable material and a layer of a water-permeable material; sealing said layers together to form a container having an opening; placing into said container through said opening a plurality of pieces of an absorbent material and then sealing together said layers in the region of said opening to close said container.

We also provide a further method of making a wound dressing according to the invention comprising the steps of placing a plurality of pieces of an absorbent material onto a first layer of one of a water impermeable material or a layer of water permeable material; placing a second layer which comprises the other said two materials over said first layer and pieces of absorbent material and then sealing together said first and second layers to form a closed container containing said absorbent pieces.

The dressing may be manufactured in a number of different ways. For example, the bag may be formed from two layers of material, e.g. polymer film, one of which is perforated to allow wound exudate to pass through. The pieces may be formed into an open bag by heat sealing, radio-frequency welding or adhering them together around the edge of bag-shape. The bag may optionally be turned inside-out so that any seam material is located inside the bag. The bag is then filled with absorbent material pieces and sealed. It may then be secured to a film, e.g. an adhesive film which extends beyond the edges of the bag.

Alternatively one piece of adhesive-coated liquid impermeable film may be used, to which a perforated or otherwise liquid-pervious film may be adhered to form a bag. The absorbent pieces may be added before or after the bag is formed. If this method is used, a part of the adhesive surface of the adhesive-coated film may be covered by a non-adhesive material prior to the application of the liquid-permeable layer so that the adhesive surface does not extend within the bag to any significant degree.

A vacuum-forming technique may be used to form the material of the bag into a suitable shape for containing the absorbent pieces during manufacture.

The dressing is preferably sterilised and packed in a bacteria-proof package.

The invention will now be further described, by way of example only, with reference to the accompanying drawings, which are:-

Figure 1, a sectional view through one embodiment of the invention;

Figure 2, a sectional view through a second form of dressing according to the invention;

Figure 3, a schematic sectional view of the dressing of Fig 2 in use upon a wound;

Figure 4, a schematic view of the dressing on a concave shaped wound;

Figure 5, a sectional view through a further embodiment of the invention; and

Figure 6, a sectional view through a further embodiment of the invention.

In Fig 1, a dressing 10 is formed from a piece of liquid-impermeable film 11 and a piece of liquid-permeable film 12 joined around their edges to form a bag with a perimeter flange. The films 11, 12 comprise a blend of ethylvinyl acetate (60 parts) and high impact polystyrene (40 parts) which form a conformable elastic film. Film 12 is contoured and has apertures in the base of depressions which form the contour, formed by placing the film material between a flat polyethylene sheet and an embossed sheet, heating the resulting "sandwich" to 80°C for 5 minutes and then peeling the film

away from the embossed sheet. The film pieces 11, 12 are circular in shape and have a diameter of about 10cm.

The pieces 11, 12 are heat sealed around at least 75% of their perimeter and the bag formed therefrom is then partially filled to about 40% of its volume with pieces of hydrophilic polyurethane foam 13, each piece being approximately cuboid in shape having sides measuring between 3 and 4cm. The remaining edges of the bag are then heat sealed together to completely enclose foam pieces 13. The heat-sealed edges form a flange 14.

In use, the bag of the dressing is placed over and around the wound or tumour to conform to its shape and contour and it may then be secured to the skin by means of adhesive tape to ensure a good seal to avoid leakage of exudate.

Fig 2 shows an alternative form of dressing in which the bag is formed in the same way as that shown in Fig 1. An adhesive flange 17, formed of a layer of hydrophilic polyurethane film 18 and a pressure sensitive adhesive 19 is placed around the bag and adhered to the flange 14 of the bag. The adhesive 19 is covered by a releaseable protector 20 until the dressing is placed on a wound. The adhesive flange has a moisture vapour permeability of greater than 200g/m^2/24h so that the skin to which it adheres does not become macerated. As an additional feature, a ring of non-woven material 21 which incorporates activated charcoal is present around the dressing beneath the adhesive flange. This ensures that the unpleasant odour of a fungating wound to which the dressing is applied is minimised.

Fig 3 shows how the above dressing shown in Fig 2 may be placed on an irregularly shaped wound 15, such as a fungating tumour. The absorbent pieces 13 have been distributed in the bag to provide cushioning around the wound and absorbency in contact with the surface of the wound. The perforated film 12 is placed next to the wound so that exudate produced by the wound can enter the bag through the perforations and be absorbed by the pieces 13. The top film 11 is impermeable to liquid so the exudate remains

within the bag. The wound is kept moist and warm by the dressing for optimum wound healing and comfort. The dressing is held in place by the adhesive flange 17 which forms a fluid-tight seal between the dressing and the skin.

Fig 4 shows the dressing of Fig 2 in use to dress a concave shaped wound. The bag is formed to an appropriate shape to fill the cavity and the adhesive flange 17 is then adhered around the wound.

The dressing is preferably sterilised and supplied in a sterile package.

Fig 5 shows an alternative form of the dressing comprising a bag made from a perforated film 12 and a non perforated film 18 which has a layer of an adhesive 19 coated thereon. The film 18 is preferably a conformable and breathable thin film such as a polyurethane film of the type used on known film dressings. The film may have a support means to allow it to be handled more easily especially in regions which extend beyond the perimeter of the bag. The dressing in the drawing has such a support means in the form of a carrier layer 22 which is a relatively stiff layer of polymeric film releasably attached to the non-adhesive surface of film 18. The carrier 22 is intended to be removed after the dressing has been applied to the patient. The bag is formed by adhering the permeable film 12 to the adhesive surface 19 of film 18. Optionally, a piece of film (not shown) is adhered over the area 23 of adhesive layer 19 which is present inside the bag. A releasable layer 20 covers and protects the exposed areas of adhesive prior to use of the dressing.

Fig 6 shows a similar dressing to that of Fig 5 although here the bag, made from a perforated film 12 and a non-perforated film 11, is adhered to the surface of adhesive layer 19. The protector papers 20 are formed into a V-shape such that a part 21 of the releaseable layer extends outwardly from the dressing so that it can be more easily held and peeled away by the user.

Example 1

A 75μm thick contoured and apertured film of a blend of 90% ethylenevinyl acetate copolymer with 10% high-impact polystyrene was placed over a planar, continuous film of the same material. The two pieces were then sealed together around their edges using "RADYNE" (trade mark) radio-frequency welding equipment set at a power of 10.8, a spring force of 150 pounds and a time of 6 seconds with a welding tool in the form of a partial 150mm circle. A portion of the edges (approx 30mm) was left unsealed so as to form an opening for the bag. The bag was then charged with pieces of hydrophilic polyurethane foam (HYPOL (trade mark)) cut to approximate cube shapes having sides of about 3-4mm. The bag was filled so that, when the bag was held vertically by an edge and shaken, the level of foam pieces came approximately half way up the bag. The opening was then closed by heat sealing.

Example 2.

A bag containing foam pieces was made as described in Example 1. A 200mm square piece of polyurethane film about 40μ thick and having one surface coated with a continuous layer of a skin friendly acrylic pressure-sensitive adhesive, covered with a releasable protector layer was prepared by cutting a circle approximately 150mm in diameter out of the central part of the releasable layer to expose the adhesive. The bag was then adhered to the exposed adhesive by pressing the part of the bag formed by the continuous film to the exposed adhesive. In this way the portion of the adhesive-coated polyurethane film which extended beyond the bag formed an adhesive flange by which the dressing may be fixed in place to the patient. The remaining protector paper which covers the adhesive of this flange is removed just prior to using the dressing.

CLAIMS

1. A wound dressing (10) comprising a plurality of discrete pieces of absorbent material (13) loosely enclosed within a conformable bag or pouch such that said pieces may move freely within said bag, said bag being permeable to water over a part (12) of its surface and impermeable to water over a different part (11) of its surface.

2. A dressing as claimed in claim 1, wherein said absorbent material is a natural or synethetic material including pulped paper-based materials, woven or non-woven fibrous materials, absorbent gels, hydocolloids, superabsorbents and foams.

3. A dressing as claimed in claim 2, wherein said superabsorbents include alginate derivaatives, cereal husk derivatives including isphagula husk derivatives, cellulose derivatives and naturally occurring or naturally derived gums.

4. A dressing as claimed in claim 2, wherein said foams comprise hydrophilic foams.

5. A dressing as claimed in claim 2 or claim 4, wherein said foams are open-cell foams.

6. A dressing as claimed in claim 2, 4 or 5 wherein said foams comprise polyurethane, carboxylated butadiene-styrene rubber, polyacrylate, polyvinylic or cellulosic foams.

7. A dressing as claimed in any preceding claim wherein said part (11) of the surface of said bag which is impermeable to water comprises a discrete region of said surface corresponding to at least 20% of the surface area of the bag which is formed from a continuous material which is impervious to liquid water.

8. A dressing as claimed in any preceding claim wherein more than 50% of said surface of said bag is formed from a material which is imperforate and impermeable to water.

9. A dressing as claimed in any of claims 1-7, wherein more than 50% of said surface of said bag is formed from a material which is permeable to water.

10. A dressing as claimed in any preceding claim, whereas said bag is formed from a continuous material (11) and a discontinuous material (12).

11. A dressing as claimed in claim 10, wherein said discontinuous material comprises an apertured film, a net, a woven fabric, or a non-woven fabric.

12. A dressing as claimed in claim 11, wherein said discontinuous material has a contoured surface.

13. A dressing as claimed in any preceding claim, wherein said impermeable part of the surface of said bag comprises a continuous synthetic polymer film which is impermeable to water.

14. A dressing as claimed in any preceding claim wherein said bag is formed from an apertured synthetic polymer film and a continuous synthetic polymer film.

15. A dressing as claimed in any preceding claim wherein the bulk volume of the absorbent pieces contained within said bag is between 30% and 70% of the volume capacity of the bag.

16. A dressing as claimed in any preceding claim further comprising a flange (14) of material extending outwardly from said bag.

17. A dressing as claimed in claim 16 wherein said flange comprises a layer of a pressure-sensitive adhesive (19) for securing said dressing to skin.

18. A dressing as claimed in any preceding claim wherein said bag contains a therapeutically active amount of a physiologically active compound.

19. A dressing as claimed in any preceding claim, further comprising an odour-absorbing material.

20. A method of making a wound dressing comprising the steps of placing together a layer of a water-impermeable material (11) and a layer of a water-permeable material (12); sealing said layers together to form a container having an opening; placing into said container through said opening a plurality of pieces of an absorbent material(13) and then sealing together said layers in the region of said opening to close said container.

21. A method of making a wound dressing comprising the steps of placing a plurality of pieces of an absorbent material (13) onto a first layer of one of a water impermeable material (11) or a layer of water permeable material (12); placing a second layer which comprises the other said two materials over said first layer and pieces of absorbent material and then sealing together said first and second layers to form a closed container containing said absorbent pieces.

22. A method as claimed in either claim 20 or claim 21 further comprising the step of adhering said container (10) to a layer of an adhesive-coated material (18, 19) such that a part of said adhesive-coated material extends outwardly from said container around at least a major part of a segment of said container.

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FIG. 1.

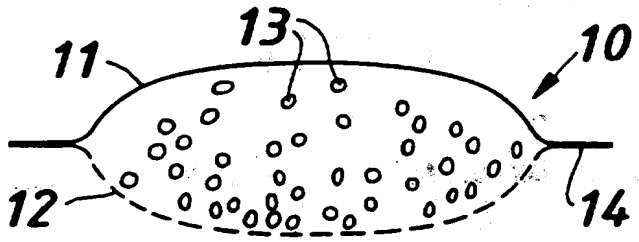


FIG. 2.

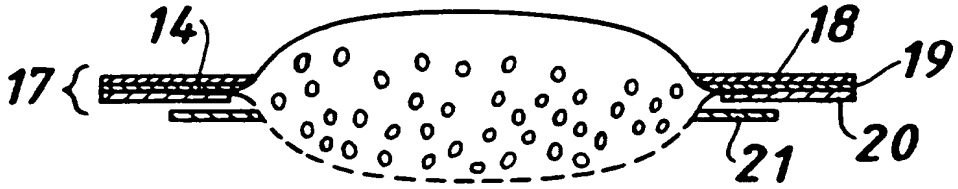


FIG. 3.

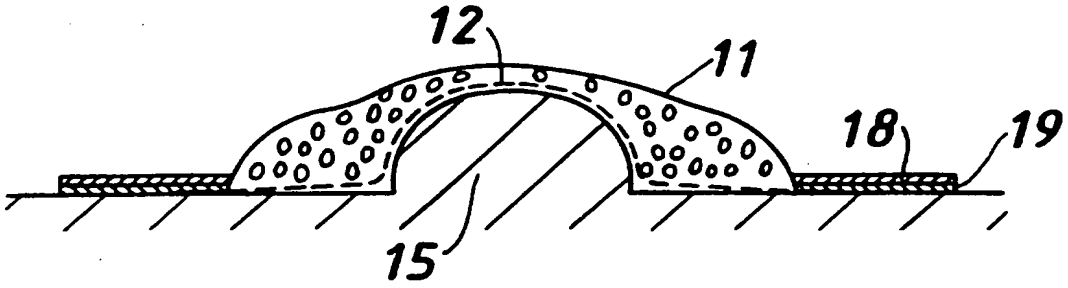


FIG. 4.

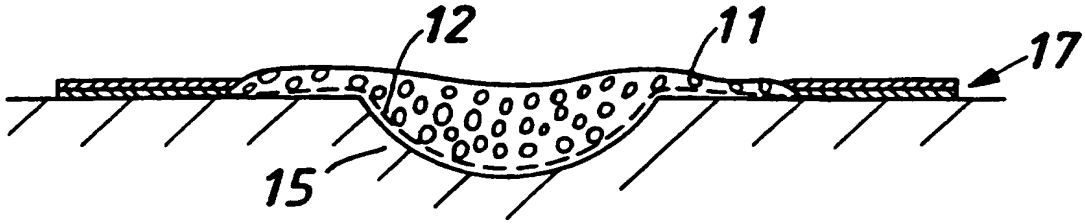


FIG. 5.

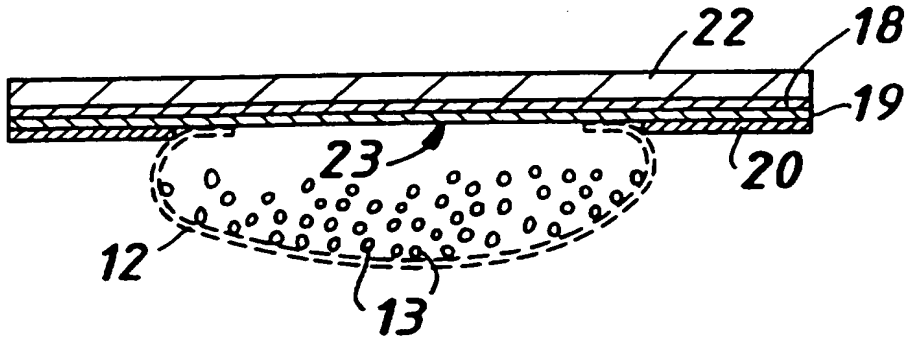
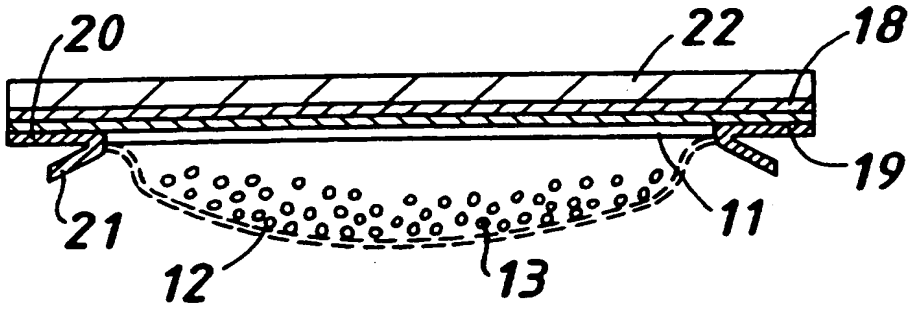


FIG. 6.



INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/GB 96/02341

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61F13/00 A61F13/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 715 918 A (T.B.LANG) 29 December 1987 see column 2, line 64 - column 3, line 22 see column 5, line 23 - line 24 ---	21
A	EP 0 171 268 A (SMITH AND NEPHEW) 12 February 1986 cited in the application see abstract see page 7, line 1 - line 2 see page 7, line 18 - line 20 see page 20, line 1 - line 3 see page 23, line 13 - line 18 see page 25, line 1 - line 9 --- -/--	1-22

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
24 January 1997	31. 01. 97

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Nice, P

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INTERNATIONAL SEARCH REPORT

Inter nal Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 3 815 601 A (J.SCHAEFER) 11 June 1974 see abstract see column 2, line 66 - column 3, line 15 see column 5, line 59 - line 64 ---	1,2,15, 20
A	EP 0 670 153 A (MCNEIL-PPC) 6 September 1995 see abstract see column 3, line 26 - line 31 see column 4, line 11 - line 15 -----	1,2,21

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